

Research Article

Translation and Validation of the Chinese Reintegration to Normal Living Index (C-RNLI) for Community Dwellers with Chronic Disabilities

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ABSTRACT

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Introduction: A successful regain of normal living is the ultimate criteria for community rehabilitation for chronic disabilities. This study aims to validate a Chinese version of Reintegration to Normal Living Index (C-RNLI).

Methodology: Cultural adaptation and translation of RNLI was performed. 183 persons with chronic disabilities attending community-based rehabilitation centers and 50 healthy persons were recruited to complete the database form, the Chinese RNLI, subjective health status (PHQ15) and wellbeing status (SWEMWBS) while occupational therapist entered the Lawton IADL.

Results: Internal consistency for C-RNLI was excellent with Cronbach's Alpha 0.911, comparable with the English version of Cronbach's Alpha of 0.9 [4,5]. The corrected Item-total correlation was high (r=0.668 (item 1) to r=0.775 (item 6)). Good testretest reliability was shown (r=0.561; p<0.05). Three components were identified among the case group (n=183) with Selfcare; Social participation and Self-efficacy (73.731% variance). Regression model revealed functional scores, wellbeing status, educational level, work status and subjective health are significant predictors. (R = 0.731; F=66.753; Sig. p<0.001). ROC curve identified cut-off score 98.864 (sensitivity 0.94 & 1-specificity 0.46) while the normalized mean score for case group is 70.05 (SD 18.45)

Discussion: Unlike other studies, the three-factor structure of C-RNLI identified from case group reflected a comprehensive outcome of both the physical, psychological and social barriers for a chronic disabled person community participation.

Conclusion: C-RNLI shows high levels of internal consistency and reliability against accepted criteria. It is short, acceptable and culturally meaningful to clients with persons with common disabilities dwelling in the community.

INTRODUCTION

A successful regain of normal living as the ultimate criteria for community rehabilitation for persons with chronic disabilities aims for facilitating better community re-integration despite their physical or psychological barriers. However, their physical functions recovery and possession of assistive devices do not always guarantee them satisfactory resumption of active living. Hence, identifying the nature and severity of those obstacles, whether they are personal, social or environmental, so



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as to design corresponding support programs is deemed essential. Currently, there is a lack of validated tools in local context that are applicable for common disability groups in Hong Kong. There are community integration measures available in foreign languages, e,g, the 15-item Community Integration Questionnaire [1] and the 27-item Craig Handicap Assessment and Reporting Tool [2]; however, the concept of community integration in these tools is based on the notions of 'disability' and 'handicap', rather than 'activity' and 'participation' as addressed by the ICF model [3]. The widely used Reintegration to Normal Living Index (RNLI) developed by Wood-Dauphinee et al. consist of 11 items measuring the respondent's perception of their performance in different life domains, namely indoor, community, and distance mobility; self-care; daily activity (work and school); recreational and social activities; family role(s); personal relationships; presentation of self to others and general coping skills; after incapacitating illness or trauma [4]. It is a reliable and valid measure for studies of community integration among people living with long-term consequences of a chronic health condition [5]. A postal version of RNLI is also available [6]. A HK Chinese version validated by Pang, et al in 2011 has been performed among stroke survivors and showed good validity and reliability [7]. A more recent validation study of another Chinese version done by Liu & Ma, in 2017 [8] with communitydwelling pre-frail and frail older people as subjects showed factor structure and model of constructs different from those of the original version. This study aims to validate a Chinese version of Reintegration to Normal Living Index (C-RNLI) and to document the profile of community integration of persons with chronic disabilities living in the community.

OBJECTIVE

1. To translate and validate the Chinese version of Reintegration to Normal Living Index (C-RNLI)

2. To document the profile of community integration among the persons with chronic disabilities living in the community

METHODOLOGY

Participants

Persons with chronic disabilities attending hospital-based or community-based rehabilitation centres or member of self-help groups were recruited. Those eligible were invited for a faceto-face interview to complete the database form including medical history, social history, and domestic information. The interviewer carried out the consent process and questionnaire completion.

The selection criteria for subjects are as follow:

1. Suffering from one or more medical disease or trauma, including cerebral vascular accidents (CVA), chronic obstructive pulmonary disease (COPD), arthritis, neuro-muscular disease, spinal cord injuries and acquired brain injuries, that lead to residual disabilities and/or impaired body functions for more than 3 months.

- 2. Can read and write traditional Chinese
- 3. Nil diagnosis of cognitive and psychotic problem

The research proposal was ethically approved by Research Ethics Committee of Kowloon Central and New Territories West Cluster, Hospital Authority of HKSAR. All subjects are voluntary to participate in the study. Eligible candidates are required to complete the translated version of the RNLI questionnaire. They have the right to withdraw from the study without any reasons.

INSTRUMENTATION

RNLI is a self-reported measurement comprising 11 declarative statements pertaining to different community integration aspects, e.g. I move around my living quarters as I feel necessary, including the following domains: indoor, community, and distance mobility; self-care; daily activity (work and school); recreational and social activities; family role(s); personal relationships; presentation of self to others and general coping skills. The first 8 items represent 'daily functioning' and the remaining 3 items represent 'perception of self'. Respondent is required to rate how well these statements describing their situation with a 4-point Likert-scale. The scores for these items in each subscale are summed and normalized to 100 to yield the subscale score and all items aggregated to give the total score. RNLI score lower than 60 are indicative of severe restrictions in self-perceived community integration, scores between 60 to 99 indicate mild to moderate restrictions, and a score of 100 indicates that the person is fully satisfied with his or her community re-integration. The English version achieved Cronbach's Alpha of 0.9 for patients [4].

The Chinese version of RNLI which was cross-culturally adapted and translated, following the standard process from the source English patient version with the 4-point ordinal scale (1 = does)



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not describe my situation, 2 = describes my situation a little, 3 = describes my situation a lot, 4 = fully describes my situation) was adopted in this study.

Translation Procedures

The translation strategy was based on minimal criteria developed by the Scientific Advisory Committee of the Medical Outcomes Trust (1997). Translation was performed using the multiple forward and backward translation protocol [9]. Following these, three independent bilingual health professionals formed a panel and translated the questionnaire into Chinese (forward translation). The mother tongue of all translators is Chinese language and their level of English is advanced. A reconciliation meeting was conducted to obtain a consensus version. Then, two native English teachers (one in secondary level and one in university level) who were blinded to the original version retranslated the Chinese version to the source language (back translation) of English. The back translation was reviewed by panel and accepted. Hence, the process formulated the final Chinese version of RNLI.

Pretesting of the translated scale was done in a small sample of 5 cases of chronic disabilities including 3 wheelchair users and 2 using walking aids; who do not have previous experience with the instrument. In-depth understanding of the questions with the purpose of reviewing inappropriate words was emphasized to ensure semantic and content equivalence. Content of the review included clarity of the items, relevance of the content to their situations, the neatness of instructions and their ability to complete the test on their own. They were asked to make suggestions wherever necessary. Minor revision was proposed after this focus review. The revision was accepted in the panel meeting. The whole process lasted for 2 months in total.

Several validated Chinese assessment tools measuring similar domains of RNLI like mobility, self-care activities, role within the family, comfort with relationships and ability to handle life events were performed to demonstrate the convergent validity of the translated version. Other than the chronic physical limitations, the motivation to participate and reintegrate into community relies heavily on their self-perception of health and wellbeing status [10]. These assessment tools include Lawton IADL scale [11] to reflect the level of independence in community living, Patient Health Questionnaire-15 (PHQ-15) [12] to reflect self-perceived health status, and Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) [13] to reflect self-perceived wellbeing of the subjects.



Lawton IADL-Chinese Version (IADL-CV) scale is an appropriate instrument to assess independent living skills. It is a functional assessment comprising of 9 items which are scored by a fourpoint scale. The inter-rater and test-retest reliability estimated by intraclass correlation coefficient (ICC) gave a value of 0.99 and 0.90 respectively. The Cronbach's alpha estimating the internal consistency was 0.86 [9].

Patient Health Questionnaire -15 (PHQ-15) validated for Hong Kong Chinese by Lee et.al is a somatic symptoms subscale derived from the self- administered version of the Primary Care Evaluation of Mental Disorders (PRIME-MD), a diagnostic instrument for common mental disorders developed in the early 1990s. It is a reliable screening tool comprised of 15 somatic symptoms that account for more than 90% of the physical symptoms reported, excluding upper respiratory symptoms associated with depression and various health outcomes.

Short Warwick Edinburg Mental Wellbeing Scale (SWEMWBS) [14] is an ordinal scale comprising 7 positively phrased Likertstyle items. It covers a range of aspects under mental wellbeing and many of which are also measured by other well-known scales. Responses are measured by a 5-point Likert scale comprising 'None of the above', 'Rarely', 'Some of the time', 'Often' and 'All of the time'. The total scores range from 7 to 35, with a higher score reflecting a higher level of mental wellbeing. The validated Chinese-SWEMWBS [13] shows high levels of internal consistency and reliability in a group of mental illness patients. From an overseas norm study, a cut

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point at 27.5 for high wellbeing. the cut point below 19.5 for poor wellbeing that may need intervention [15].

DATA COLLECTION

A total of 183 subjects attending hospital-based rehabilitation centers, community-based rehabilitation centers & self-help groups forming the case group; and 50 healthy volunteers from staff of these centers were recruited as control group by convenience sampling and with consent. They were interviewed by case therapists to complete the consent process and the database form. They were then given the 4 assessment forms, namely the Chinese RNLI, the SWEMWBS and PHQ-15 for self - completion. Case therapist also completed the IADL within 2 days for patients who successfully completed the scales. 20 patients were randomly chosen from this sample to complete the self-reported assessments forms two weeks later for testretest measurements.

DATA ANALYSIS

Descriptive statistics was used to summarize the demographic data of all subjects. Internal consistency tests were conducted to evaluate the homogeneity of the subscales with Cronbach's alpha (>0.8 is considered comparable to the original measure) and Item-total correlation of p<0.05 will be accepted. Alpha coefficients of 0.70 or higher and item-total correlation higher than 0.4 were indicating good reliability [16,17]. Convergent validity tests was conducted to correlate the translated RNLI with Lawton IADL, PHQ-15, SWEMWBS at p<0.05 level. The normality of the items of all measures was investigated and acceptable range of skewness <2 and kurtosis <7 is adopted [14]. Factor analysis was utilized to assess the internal structure of the measure. SPSS 26.0 version was used.

RESULTS

Demographics

Out of 233 participants, 118 (43.2%) were female and 114 were male. Their mean age was 57.86 (SD 12.93), 112 (41.0%) were educated up to secondary level and 74 (27.1%) were at tertiary level. 145 (53.1%) were married and 61 (22.4%) were single, the remaining 25 patients were either divorced or loss of spouse. 211 (77.3%) of them were living with family while 4 (1.5%) of them were either living in old age home or hostel. Only 20 of them (7.3%) with their residence place non-lift-landing.

Within the 183 participants with chronic disabilities, 42 (23.0%) were unemployed and 77 (42.1%) retired without active work, while remaining are working as fulltime 22 (12%) or part-time 11 (6%) mostly; 6 (3.3%) of them claimed as regular volunteer, 20 (10.9%) of them were housewife and 2 (1.1%) were students. Only 24 (13.1%) rely on social security funding support.

		Case Gp			Control g	gp	
		N=183			N=50		
Characteristics		N (%)	Mean	SD	N (%)	Mean	SD
Sex	Female	83			35		
		(45.4)			(70)		
	Male	100			15(30)		
		(54.6)					
Marital status	Divorced	15			2 (4)		
		(8.2)			05(50)		
	Married	121			25(50)		
	Cingle	(00.1)			22		
	Single	(21.2)			23		
	Widow	(21.3) 9 (4.4)			(40)		
Work	Full time	0 (4.4)			50		
WOIK	Full unle	22 (12)			(100)		
	Part time	11 (6)			(100)		
	Housewife	20					
	Tiousewile	(10.9)					
	Retired	77					
		(42.1)					
	Student	2 (1.1)					
	Unemployed	44					
	- 1 5	(24.1)					
	Volunteer	7 (3.8)					
Years with		. ,	6.61	11.162			
chronic							
disease							
Age			57.86	12.925		36.86	10.70
Years of			11.41	9.041		15.29	4.282
education							
Diagnosis	Chronic lung	1					
	disease	(0.55)					
	Stroke	111					
		(60.7)					
	Arthritis	13					
	National and a state	(7.1)					
	Neurological	10					
	Neuromussular	(5.5)					
	disease	5(2.7)					
	Musculoskeletal	5 (2 7)					
	Traumatic brain	1 (0.5)					
	Diabetes	4 (2 2)					
	Brain tumor	3(16)					
	Spinal cord	3 (1.5)					
	iniuries	2 (1.1)					
	others	28					
		(15.3)					

Profile of Health Conditions

The case group was not homogeneous in primary diagnosis and severity in mobility limitations. The mean onset time of their diagnosed conditions was 6.6 years (SD 11.12). The most common diagnosis was stroke (40.7%), 5.2% suffered from other neurological conditions due to diseases, trauma or tumor; 7.3% suffered from musculoskeletal problems like arthritis, spinal cord injuries or back problems; 1.8% diagnosed with degenerative neuromuscular diseases, 1.9% presented with pulmonary or diabetic conditions. 10.3% were reported with



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mobility limitations without formal diagnosis. It was interesting that around 60% of the cases were having more than one comorbidity, from 1 (23.4%) to 6 (0.4%).

Their functioning level were reflected by the Lawton IADL scores. They scored range from 0 to 27 marks (the higher the better), (mean 18.55; SD 6.345). Around 90% of them found no difficulty in using telephone and taking medications daily. Whereas assistance is required in all remaining items ranging from use of money handling (22.2%), public transport (30.4%), shopping (37.4%), meal preparation (49.6%), laundry (55.2%), household tasks (62.6%), repair and maintenance work (76.4%). Significant difference was found between case group and control group (p=0.000) and across 12 diagnoses (p<0.001).

Subjective health and wellbeing status

In perceived health status as revealed from PHQ15 scores, the case group achieved the mean score of 5.99 out of 30 (SD 4.60; skewness 1.506). This result indicated that majority of our participants were not disturbed by somatic symptoms commonly found in general population like pain, dizziness, shortness of breath, gastro-intestinal problems, poor sleep or fatigue. The percentages of respondents who fell into the PHQ-15 severity categories of minimal (0–4), mild (5–9), moderate (10–14) and severe (15 or above) were 46.4%, 37.3%, 12.9% and 3.4%, respectively which resembles general local population [12]. Significant difference was found between case group and control group (p<0.05) but insignificant across different diagnosis.

In perceived mental wellbeing as revealed from the SWEMWBS, they scored 24.84 (mean; SD 5.40). According to the UK norm data, 22 (13.9%) of them reported poor wellbeing status (below cutoff 19.5) and the 51 (11.3%) of them reported good wellbeing (above cutoff 27.5), which was different from the UK general population of upper & lower 15% distribution [15]. Significant difference was found between case group and control group (p<0.05) but not across different diagnosis.

C-RNLII Scale Profile

In C-RNLI results, the scale showed a normal distribution with the normalized mean score is 70.05 (SD 18.45; range 25 to 100; skewness -0.451). The highest score belongs to the group of cases suffering from COPD and Arthritis (mean 97.73; n=1);

SD 15.63) while the lowest score was reported by the cases with Neuromuscular disease (mean 45.91; SD 11.18) and Brain Tumor (mean 45.46; n=1). Similar to other results shown in functional scale and subjective ratings of health and wellbeing, significant difference was found between case group and control group and also across the 12 diagnoses.

SCALE RELIABILITY

Internal consistency

The sample displayed a normal distribution of C-RNLI scores (n=183, mean 70.50; SD 18.45; skewness -0.192; kurtosis 0.756). Internal consistency for C-RNLI was excellent with Cronbach's Alpha of 0.911. This finding is comparable with the English version of Cronbach's Alpha of 0.9 and 0.91 of another sample with over 600 adults with mobility limitation post discharged for at least one year [5]. The corrected Item-total correlation was high with Spearman's rank correlation coefficients ranges from r=0.668 (item 1) to r= 0.775 (item 6).

Table 2: Item-total statistics for the C-RNLI (N=180).						
	Mean	SD	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's Alpha if item deleted
Item 1	3.30	0.9 21	27.76	55.300	0.622	0.905
Item 2	2.88	1.1 27	28.18	52.307	0.681	0.902
Item 3	1.99	1.1 21	29.07	52.856	0.648	0.904
Item 4	3.03	1.0 75	28.03	53.127	0.663	0.903
Item 5	2.40	1.1 32	28.66	53.421	0.603	0.907
Item 6	2.71	0.9 00	28.35	54.553	0.700	0.902
Item 7	2.83	0.9 96	28.23	53.230	0.719	0.900
Item 8	2.97	0.9 54	28.09	54.048	0.693	0.902
Item 9	3.17	0.8 55	27.89	55.402	0.670	0.903
Item 10	3.08	0.8 96	27.98	54.692	0.692	0.902
Item 11	2.70	1.0 19	28.36	54.210	0.628	0.905

Test-retest Reliability

Out of the 183 participants, randomly selected 20 patients as convenient subsample to evaluate the test-retest reliability in 2 weeks' time. Correlation between the test and retest mean scores of these participants were likewise high (r =0.561; p<0.05). The mean difference was insignificant for this subset across two test period with -0.16 (SD 1.03, 95% Cl -0.58, 0.26; p>0.05), suggesting a high reliability for the Chinese version of the scale in Test-retest.







Construct validity

Factor loadings were analyzed for the total 233 subjects using Principal Component Analysis with varimax rotation performed. The analysis identified 2 components (Eigenvalues 0.636 - 0.859 and 0.607 - 0.896; 70.12% variance) confirmed the Chinese version measured the same construct as the English version.

However, different results were generated when the same analysis were performed for the 183 subjects with chronic disabilities. Three components were identified where item 1,2 and 4 denotes Selfcare abilities (Eigenvalue 0.726 - 0.857); item 3, 5 ,6 and 7 denotes Social participation (Eigenvalue 0.706 - 0.780) and item 8,9, 10 and 11 denotes Self-efficacy (Eigenvalue 0.647 - 0.872) with total variance of 73.73 explained.

Table 3: Loadings of the C-RNLI items in Principal Component				
Analysis (varimax rotation with Kaiser Normalisaiton) Rotated				
Component Matrix.				

	Self-efficacy	Social participation	Selfcare
	Component	Component	Component
	1	2	3
Item 1	0.262	0.136	0.857
Item 2	0.188	0.408	0.726
Item 3	0.071	0.706	0.457
Item 4	0.307	0.242	0.759
Item 5	0.153	0.780	0.204
Item 6	0.382	0.750	0.148
Item 7	0.382	0.726	0.210
Item 8	0.647	0.493	0.148
Item 9	0.872	0.119	0.288
Item 10	0.853	0.196	0.260
Item 11	0.701	0.306	0.187

Concurrent validity

Non-parametric Spearman's test for the case group was performed. Results showed scores of C-RNLI correlate negatively and significantly with chronicity (years on onset), comorbidities, educational level, work status of all the subjects (p<0.01). C-RNLI showed medium to high association and significant correlation with Lawton IADL (r=0.634; p<0.001), PHQ15 (r=-0.308; p<0.001), and SWEMBS (r=0.498; p<0.001). When the subscores of C-RNLI namely the 'selfcare abilities', 'social participation' and 'self-efficacy' were analyzed against the functional and self-perceived health/wellbeing status, moderate to high association were found at a significant value (p<0.001). Hence, C-RNLI might reflect a comprehensive outcome of both the physical limitations as well as the psychological limitations for a chronic disabled person in reintegration to community living.

Age, education & gender effect

Spearman's rank correlation revealed C-RNLI total score was mildly correlated with age (r=0.178; p<0.05) and work status (r=-0.161; p<0.05); but not with gender, years of illness and educational level.

Regression and Prediction

Stepwise linear regression was performed among the variables and scores from standardized measures against C-RNLI. Results revealed a model with functional scores (Lawton IADL), wellbeing status (SWEMBS), educational level, work status and subjective health (PHQ15) are significant predictors. (R = 0.779; F=67.693; Sig. p<0.001). Discriminant analysis was performed and confirmed that C-RNLI normalized total score is valid to cut off case group from control group (Wilks' Lambda = 0.683, Chi-square = 87.575; Sig. p=0.000). ROC curve identified positive if less than or equal to score 98.864 (sensitivity 0.94 & 1-specificity 0.46).

DISCUSSION

The present study sought to provide a reliable and valid measure of reintegration to normal living for use among Chinese speaking persons with chronic disabilities in Hong Kong. Results showed that the translated version of C-RNLI was a reliable and valid measure in our sample. It is a relatively short measure (only 11 items), the C-RNLI showed good internal consistency (Cronbach's alpha 0.932). and stability over a period of 2 weeks among the selected clients. Moreover, the scale showed significant correlations with other functional and subjective health and wellbeing indexes (p<0.001) suggesting good concurrent validity. The results of this study also showed high validity of the scale. Factor analysis supported threecomponent concept for patient use, with suggested cut-off score. Several studies have revealed the inadequate demonstration by the two physical performance and self perception subscores where hope, acceptance, motivation and coping that are conducive to life satisfaction over time can be isolated here as social participation [18-20].

The scoring C-RNLI appears to be less prone to bias as no age and gender effect. Nevertheless, it is correlated to clients with different diagnosis. Strong prediction from educational level and work status sheds light to rehabilitation workers that there



may be more areas to work on, other than selfcare abilities which usually became static in chronic conditions. In order to enhance the patients' resumption of normal living, measures to improve their chance to receive further education and opportunities in employment are deemed important in healthy living. It is a huge benefit that functional capacity, mental wellbeing and self-efficacy among patients with chronic illness can be measured reliably at community phases at one glance and posed more research opportunities for wellbeing building interventions to be developed and evaluated.

LIMITATIONS

This study has a number of limitations. The sequence of testing is not randomized and may confound results with order effects. The small number of subjects in test-retest, owing to operational problems, may pose errors in analysis. Besides, whether the stability of the measure can be extended to more than 2 weeks also needs further investigation. In addition, the scale's capacity to detect changes at both individual and population levels has not been reported in this study.

CONCLUSION

The Chinese RNLI shows high levels of internal consistency and reliability against accepted criteria. It is short, acceptable and culturally meaningful to the community dwellers with chronic disabilities in varies stage of rehabilitation. The instrument can be used as a routine measure in community rehab to explore the level of patient's reintegration into normal living. Intervention along the 3 factors can be implemented. Special considerations can be placed for cases with problems in work status and multiple co-morbidities. The cut-off score can be utilized to plan service needs. Further validity and reliability studies with larger sample size are needed to ascertain the generalization of findings. Furthermore, its potential to detect differences of integration into normal living across various diagnoses of patients or normal people needs further local studies in developing normative data and sensitivity of changes.

Impact & summary

• A reliable measure (with Cronbach Alpha = 0.911) in reintegration into normal living for disabled persons to reflect the level of difficulties in community reintegration

• The measure consists of 3 factors related to



reintegration into living namely selfcare, social participation and self-efficacy

• Work status and educational level are strong predictor for high score

• Score of 70.1 is the central mean for unhealthy group; score 98.9 is for the healthy group

Disclosure statement

"All authors have read and approved the submitted manuscript, the manuscript has not been submitted elsewhere nor published elsewhere in whole or in part, except as an abstract (if relevant)."

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Data Availability Statement: The dataset presented in this study is owned by Hospital Authority, HKSAR and not available on request.

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